

**JOURNAL**  
**OF THE**  
**WASHINGTON ACADEMY OF SCIENCES**

VOL. 9

OCTOBER 4, 1919

No. 16

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BOTANY.—*The anay, a new edible-fruited relative of the avocado.*

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One of the most interesting results of the explorations in search of new and desirable avocados and related fruits, carried on in Central America for several years past by Wilson Popenoe of the Office of Seed and Plant Introduction, is the discovery of the anay. Guided by the reports of natives, Mr. Popenoe first met with the species on September 23, 1916, when two trees were found at the entrance to the Finca El Compromiso, half a mile from Mazatenango, Guatemala, at an elevation of about 365 meters. Other trees were known to the natives in the near-by forest, and were visited by them at the proper season to secure the fruit. The two trees seen by Mr. Popenoe had been left to provide shade for young coffee trees when the forest was cleared. They were about 22 meters high, with the tall and slender trunk bare of branches for a considerable distance, and an open rounded crown. On this occasion Mr. Popenoe, being unable to find a native venturesome enough to climb the trees, had to content himself with pieces of the bark and with some of the fruits, which were lying in profusion on the ground. He also secured leaves from sucker shoots at the base of one tree, but comparison with specimens secured from the same tree on a later trip shows that these belong to some other plant.

The fruits of the anay, which ripen in August and September, are very similar in external appearance to those of certain types

of avocado (*Persea americana*). They are 10 to 15 cm. long, ellipsoid-pyriform, sometimes curved, sometimes pointed at apex, often with sharply defined neck, with the body slightly compressed, and smooth, glossy, purplish black surface. The skin is very thin and membranous, adhering closely to the firm, oily, rather scanty flesh. This is divided into two zones of color, equal in thickness, the outer pale green, the inner greenish cream-color, both being more sharply defined than is ordinarily the case in the cultivated avocado. The flesh has a rich, bland flavor, like that of a very good avocado, but faintly sweetish. The large, obovoid seed, with the pointed end toward the base of the fruit, has a thick, almost fibrous, outer seed coat and a membranous inner one closely including the cotyledons, but not always reaching to their apex. The pubescent plumule lies immediately at the base of the cotyledons, while in the avocado it is located some distance above this point. The fruits fall while still hard, ripening in two or three days, and germinating freely on the ground beneath the parent tree. Most of the specimens found by Mr. Popenoe had been attacked by insects, which tunneled through the seeds.

The notes from which this description of the fruit has been drawn up were made by Mr. Popenoe on his first visit to the trees. On a later visit, on January 17, 1917, a mozo was found who ascended one of the trees by means of a near-by palm and threw down branchlets with leaves, young fruit, and a very few flowers. Study of these shows that the anay is not a *Persea*, as Mr. Popenoe at first supposed, but an undescribed species of the genus *Hufelandia*, which is at once distinguished from the avocado (*Persea americana*) and its near relatives by the fact that the anthers are 2-celled instead of 4-celled.

Since collecting the anay at Mazatenango, on the west coast of Guatemala, Mr. Popenoe has found it at Chamá, on the Río Chisoy in the Usumacinta basin in Alta Verapaz, northeastern Guatemala, at an altitude of about 300 meters, although no specimens were obtained. It is the belief of Mr. Popenoe that the name of the old Maya settlement Anaité, farther north in

the same valley near the ruins of Menché Tinamit and Yaxchilan, has reference to the former abundance of the anay in the same region.

The anay, both in the vicinity of Mazatenango and in the Usumacinta Valley, grows in moist regions at an elevation of only 300 to 365 meters. For this reason Mr. Popenoe believes that it will not succeed in California, but that it may do well in southern Florida. Young trees grown from seeds collected by Mr. Popenoe are now cultivated in the Plant Introduction Garden at Miami, under the Seed and Plant Introduction number 43432, and their future will be watched with much interest. In its native haunts the species was reported by natives to flower in May, but from the specimens collected by Mr. Popenoe it is clear that the flowering season is December and January. The fruit ripens in August and September.

As this species of *Hufelandia* is known throughout its range as anay (pronounced ă-nī,<sup>1</sup> and as it is intended to bear the same name on its introduction into culture in the United States, it may be called

**Hufelandia anay** Blake, sp. nov.

Large tree, up to about 22 meters high, with thick, reddish brown bark; branchlets stout, angulate, densely griseous or rufescent-puberulous with sordid incurved hairs, at length glabrate; leaves alternate, rather crowded toward the ends of the branches, the blades 13 to 20 cm. long, 7.5 to 10 cm. wide, oval, abruptly short-pointed (acumen about 1 cm. long, obtuse), rounded to cuneate at base, chartaceous, pinnate-veined with 10 to 14 pairs of lateral veins diverging at an angle of about 70°, above green, sordid-puberulous along costa and lateral veins, essentially glabrous on the slightly prominulous-reticulate surface, beneath glaucous, rather sparsely puberulous on the surface with whitish hairs, more densely so on veins with sordid loose hairs, with rather prominent secondary veins and obscure tertiaries; petioles stout, sulcate, sordid-puberulous especially above, 2.5 to 3.5 cm. long; panicles axillary, sordid-puberulous, sparsely branched (at least in fruit) and rather slender, 9 to 15 cm. long (including the 4 to 7 cm. long peduncle); pedicels in young fruit somewhat clavate, about 3 mm. long; perianth sordid-pilosulous on both sides, 2.5 mm. long, the segments subequal, oval, rounded at apex, 1.5 mm. wide; perianth tube extremely short; stamens of series I oblong-elliptic, 1.9

<sup>1</sup> The system of diacritical marks here used is that of Webster's Dictionary.

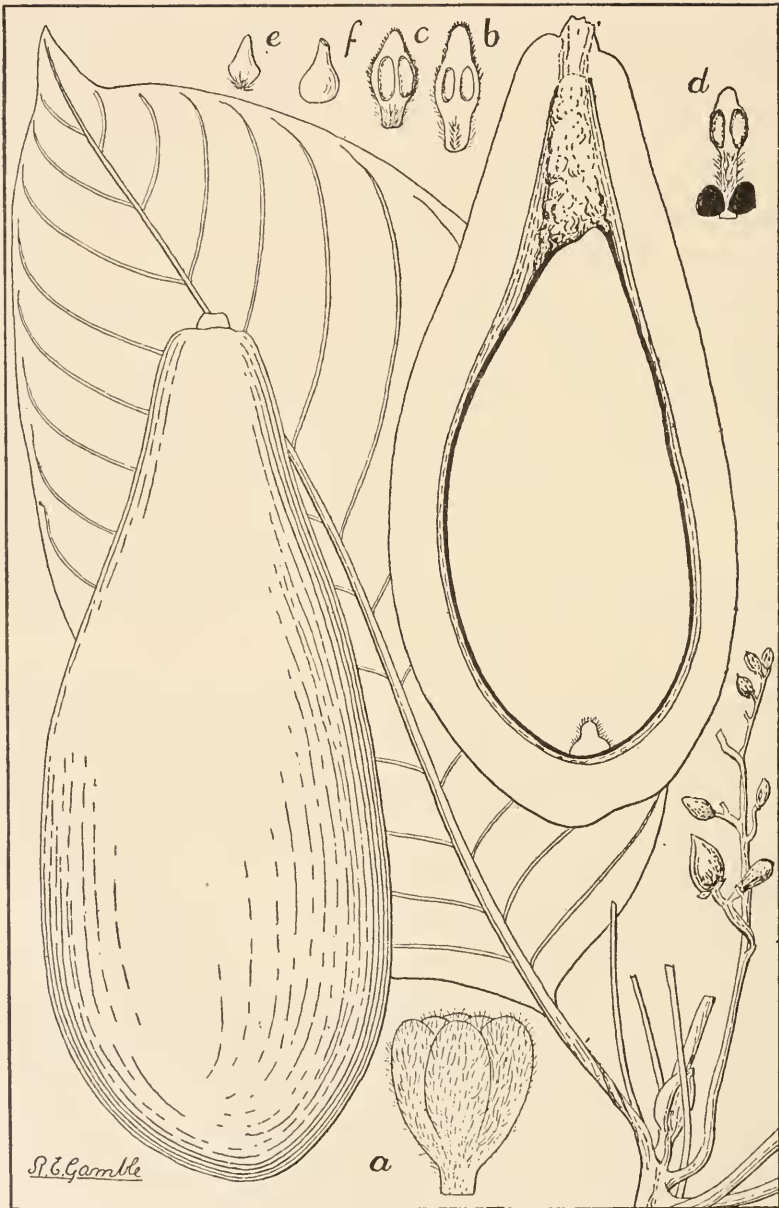


Fig. 1.—*Hufelandia anay*. Leaf, fruit, and longitudinal section through fruit and seed, showing plumule at base of seed, all nearly natural size; *a*, flower; *b*, stamen of series I; *c*, stamen of series II; *d*, stamen of series III, seen from dorsal side; *e*, staminode; *f*, ovary. Details about scale 10.

mm. long, sordid-pilose on back and ciliate to upper level of anther sacs, papillose above, the filaments about 0.4 mm. long, pilose down middle inside, gradually widened into the 2-celled anther, this narrowed into an obtuse appendage about as long as the filament; those of series II similar, 1.5 mm. long, the filaments 0.35 mm. long, pilose on both sides, the 2-celled anther 0.65 mm. long, the triangular obtuse papillose tip 0.5 mm. long; those of series III 2 mm. long, the filaments comparatively slender, 1 mm. long, pilose outside and down midline within, bearing at base two globose sessile basally pilose glands slightly more than half as long as the filament, the oval extrorsely 2-celled anther 1 mm. long (including the 0.3 mm. long obtuse papillose appendage), papillose-pilosulous on back; staminodes triangular, acuminate, 0.9 mm. long, very shortly stipitate, pilose dorsally, glabrous inside; ovary subglobose, narrowed into and about equaling the stout style and obliquely conical stigma; fruit ellipsoid-pyriform, glossy black, thin-skinned, 10 to 15 cm. long; seed very large, obovoid, with thick outer coat; embryo at extreme base of cotyledons.

Type in the U. S. National Herbarium, no. 1011734, collected in loamy soil of tropical forest at Finca Compromiso, Mazatenango, Guatemala, at an altitude of about 365 meters, January 17, 1917, by Wilson Popenoe (no. 754).

*Hufelandia anay* is easily distinguished from the two species of the genus previously described from Mexico and Central America, *H. mexicana* Mez and *H. costaricensis* Mez Pittier, by the fact that its leaves are glaucous beneath. From *H. pendula* (Swartz) Nees, of the West Indies, which agrees in the glaucescence of its leaves, *H. anay* differs in its larger oval leaves persistently pubescent beneath, its larger sordid-pilosulous flowers, and its much larger fruit.

A related species, collected on the Volcan de Poás in Costa Rica by Mr. Henri Pittier some years ago, may also be described in this connection. The native name of this tree is not known, nor is the nature of its fruit.

*Hufelandia ovalis* Blake, sp. nov.

Medium-sized tree; branchlets stoutish, subangulate, olive-brown, cinereous-puberulous with appressed hairs, glabrate; leaves alternate, the blades 5.5 to 8 cm. long, 3 to 4.7 cm. wide, oval, acutish or obtuse, at base cuneate to rounded-cuneate, pinnate-veined with 6 to 7 pairs of prominulous lateral veins, thick-pergamentaceous, above dull green or slightly lucid, prominulous-reticulate, rather sparsely pilosulous with loose whitish hairs, glabrescent at maturity, beneath glaucous, finely prominulous-reticulate, pilosulous with loose, curved, whitish hairs, along the veins more densely sordid-pilosulous; petioles stout, flattish, sordid-pilosulous, 7 to 11 mm. long; peduncles axillary, loosely sordid-pilosulous, 2.5 to 3.5 cm. long; panicles ovoid, dense, shorter



than the leaves, sordidly tomentose-pilosulous, 1.8 to 2.5 cm. long, 1.5 to 3 cm. wide; pedicels 1 to 1.5 mm. long; perianth 2.5 mm. long, soon deciduous, sordidly pilosulous-tomentulose both sides, the tube obscure, the segments subequal, oval, rounded at tip; stamens of series I 2.2 mm. long, the stout filaments 0.8 mm. long, pilose on back and down midline within, the 2-celled ovate eciliate sparsely papillose anthers 1 mm. long, the quadrate obtuse appendage 0.3 mm. long; those of series II similar, 2.4 mm. long (filament 1 mm., anther 1.1 mm., appendage 0.3 mm.); those of series III 2.2 mm. long, the filaments slender, pilose, 1 mm. long, bearing at base 2 cordate-globose short-stipitate glands essentially as long, the extrorsely 2-celled anther 0.8 mm. long, the thick truncate appendage 0.4 mm. long; staminodes 1.1 mm. long, deltoid, acute, pilose on back and on the short, broad stipe; ovary glabrous, globose-ovoid, 1.5 mm. long, narrowed into the 0.5 mm. long style and oblique stigma.

Type in the U. S. National Herbarium, no. 578438, collected on the Volcan de Poás, Costa Rica, altitude 2300 meters, March 31, 1907, by H. Pittier (no. 2040).

*Hufelandia ovalis* is related to *H. anay* and *H. pendula*. From the former it may be easily distinguished by its much smaller, finely prominulous-reticulate leaves, its longer filaments, and its larger floral glands. From the latter it differs in its thicker more finely reticulate leaves, its dense ovoid panicle, and its longer filaments.

GENETICS.—On Mendelian inheritance in crosses between mass-mutating and non-mass-mutating strains of *Oenothera pratincola*.<sup>1</sup> FRIEDA COBB and H. H. BARTLETT.

A former paper<sup>2</sup> has dealt with the striking difference in mutability between certain strains of *Oenothera pratincola* that are morphologically identical. The strains in question were derived from seeds of wild plants collected in 1912 at Lexington, Kentucky. Several of them, typified by the strain designated as Lexington C, show only a moderate degree of mutability.

<sup>1</sup> Papers from the Department of Botany of the University of Michigan, No. 160. This paper is published as presented at the Pittsburgh (1917) meeting of the Botanical Society of America. It has been lying in manuscript since the fall of 1917. The data upon which it is based have since been greatly amplified. The new results are based upon much larger cultures and verify those here presented, but are not yet ready for publication. A preliminary abstract has appeared elsewhere. (Proc. Mich. Acad. Sci. 1918: 151. 1919.)

<sup>2</sup> BARTLETT, H. H. *Mass mutation in Oenothera pratincola*. Bot. Gaz. 60: 425-456. 1915.